Chapter 7 - SOLID WASTE PROGRAM

The City is not proposing any changes to the current Residential Waste Collection operations as described below. These services are planned to continue and expand into residential areas where growth occurs.

RESIDENTIAL WASTE COLLECTION

CITY OPERATION

The City has utilized three 25-yard rear load packer trucks for curbside collections since April 2004. Prior to 2004, solid waste collection was a contracted service.

TRASH COLLECTION

The City offers residents curbside collection of trash once per week. The City's residential areas are divided into 4 zones, with trash collection occurring Monday through Thursday each week. Residents are required to place a pre-paid trash sticker on their trash bag or container. Stickers may be obtained at 6 retail outlets in the City and at City Hall. The cost of the sticker is designed to cover the trash-tipping (dumping) fee that is charged by Harford County at its landfill or incinerator. The current charge is $50 per ton of trash. This "Pay as You Throw" system has been in place since 1993. Recyclables, bulk items, and yard waste are collected free of charge to the resident and therefore do not require placement of a sticker.

CURBSIDE RECYCLING

The City offers residents curbside collection of recyclables once per week in conjunction with regular trash collection. The City's residential areas are divided into 4 zones and recycling collection occurs Monday through Thursday each week, on the same day as trash collection. In September 2010, the City joined with Harford County in offering single stream recycling to its residents, allowing for a greater variety of items to be recycled and without the necessity of sorting paper and bottles into separate piles. Each residence has been given a 22-gallon green and a 22-gallon blue bin for storage of recyclables and collection each week. Residents may purchase more recycling bins as needed at City Hall.

ELECTRONICS

The City collects electronics (computers, monitors, TV, cell phones, etc.) during weekly curbside collection for all residents. Electronics contain hazardous metals, such as lead, that should be kept clear of the landfill and incinerator. The electronics are shipped to a reclamation facility. Residents are required to place a pre-paid trash sticker on electronic items except, for cell phones.

SCRAP METAL AND BULK ITEMS

Residents may call in for special curbside collection of metal items such as refrigerators, washers, dryers, and bicycles, as well as other bulk items such as sofas and mattresses. This service is free of charge. Appointments are set for each Friday for collection of these materials. The scrap metal is staged on City grounds in 30-yard roll-off containers. An outside contractor

then transports the containers to a recycling facility in Baltimore. Products with Freon based gases have the Freon removed prior to being recycled. Other bulk items are taken to the Harford County landfill.

YARD WASTE

The City offers residents curbside collection of yard waste, free of charge, 2 times per month from April through January. The City's residential areas are divided into 2 zones, with yard waste collection occurring the 1st and 3rd or 2nd and 4th Fridays, depending on location. The yard waste is taken to the Harford County composting facility.

OIL & ANTIFREEZE

The City of Aberdeen offers self-service drop off of used motor oil and antifreeze. The City of Aberdeen has consolidated its waste oil collection sites to one location at 361 Michael Lane. There are separate receptacles each for non-contaminated motor oil and anti-freeze. The containment area is under cover and is open to the public 24 hours a day.

ENVIRONMENTAL AWARENESS

In April of each year, the City hosts an Earth Day celebration at Festival Park in downtown Aberdeen. The groups involved have a dedicated interest in preserving our environment and passing the word on to others. The City and sponsors present the event to give participants entertaining and educational information on a variety of environmental topics. In 2010, the City had over 50 exhibitors that included groups interested in land preservation, Chesapeake Bay education, recycling, clean water, hazardous waste clean-up, composting, native plant gardening, environment-friendly products, wildlife care, and animal rights.

The City had 13 carnival-type games all made from recyclables and scrap. All of the 19 prize items awarded also had recycled content. One of the highlights the last 3 years has been the 30-foot high rock-climbing wall. Free Tie Dye has also been offered the last 5 years. Anyone bringing a cotton T-shirt or purchasing a recycled Earth Day logo T-shirt could tie-dye his or her shirt for free. Overall attendance at the 2010 Earth Day Festival was estimated at over 4,000.

Chapter 8 - SENSITIVE AREAS ELEMENT

OVERVIEW

The Economic Growth, Resource Protection, and Planning Act of 1992 requires local governments to adopt a "Sensitive Areas" element in the Comprehensive Plan to address specific environmental resources. The Act requires protection of the following four types of sensitive areas across the State: (1) streams and their buffers; (2) 100-year floodplains; (3) habitats of threatened and endangered species; and (4) topography and steep slopes. The Act also permits local governments to define each sensitive area and to determine levels of protection.

This chapter describes Aberdeen's approach to protecting eight distinct types of Sensitive Areas, defining each and justifying the level of protection for each: (1) streams and their buffers; (2) 100-year floodplains; (3) habitats for threatened and endangered species; (4) steep slopes; (5) forests; (6) hydrogeology; (7) critical areas; and (8) historical sites. Each sensitive area is justified to the extent that it is regulated by the City of Aberdeen.

STREAMS, WETLANDS, AND THEIR BUFFERS

Aberdeen and the future planning areas contain a network of tributaries, streams, and creeks that feed into the Chesapeake Bay. The streams and creeks located within Aberdeen and the future planning areas are Swan Creek, Carsins Run, Gashey's Creek, Cranberry Run, and Gray's Run.

Definitions

Streams are defined as any natural or man-made watercourse that conveys stormwater runoff and maintains a base flow for at least nine months of the year.

Stream buffers are defined by the State as areas that extend a minimum of twenty-five feet from the top of each stream bank along both sides of a stream.

Justification for Protection

Streams and their buffers are valuable to people and vital to our natural resources. Streams and their buffers are home to numerous species of animals and plants, and the streams themselves serve as lifelines to the Bay.

Buffers provide habitat for birds and other animals and can serve as good areas for hiking, hunting, and nature observation. Establishing natural buffer areas along tributaries to the Chesapeake Bay is one of the most important components of the Bay cleanup effort. Healthy buffers hold soils in place, can provide a refuge for threatened animals and plants, filter storm water runoff pollutants, hide predators and their prey, and keep streams shaded and cool. Stream buffers ideally include:

- Floodplains, where most streamside wetlands are formed and where energy dissipation, natural filtration, food storage, and water storage occur.

- Stream banks and steep slopes, which should remain intact to prevent erosion from clogging the stream bed and provide habitat for plants and animals.

- Stream side forests and other vegetation, which provide habitat, stabilize banks, provide shading, reduce pollutants, and produce leaf-litter supporting a host of microscopic shredders, filter feeders, and decomposers that form the base of a healthy stream food chain.

100-YEAR FLOODPLAINS

The Aberdeen Floodplain Management Ordinance was originally adopted in 1992 and, as a result of Federal Emergency Management Administration (FEMA) updates to the Flood Insurance Rate Maps (FIRM) and Floodway Maps, amended in 2000. The City regulates floodplain management and construction activity within designated floodplains. These provisions establish standards for new construction or substantial improvements to existing structures in accordance with FEMA guidelines, in order to prevent, as far as possible, damage to buildings and structures from flooding. For further information refer to the Code of the City of Aberdeen, Chapter 275, Floodplain Management.

Definition of a Floodplain

a. A relatively flat or low land area adjoining a river, stream, or watercourse that is subject to partial or complete inundation.
b. An area subject to the unusual and rapid accumulation or runoff of surface waters from any source.
c. An area subject to tidal surge or extreme tides.

Justification for Protection

The historical reasons for floodplain protection have been to guard against injury to people and to prevent the destruction of property. Undisturbed floodplains serve a variety of functions having important public purposes and benefits.

Floodplains moderate storm floodwaters, absorb wave energies, and reduce erosion and sedimentation. Wetlands found within floodplains help maintain water quality, recharge groundwater, protect fisheries, and provide habitat and natural corridors for wildlife. Stream buffers found within floodplains also help to maintain water quality.

Safeguarding the many natural functions performed by the floodplains benefits adjoining and downstream communities by minimizing the risks (and costs) associated with the loss of life and

property; by contributing to the maintenance of water quality and quantity which may directly affect drinking water supplies and recreation opportunities; and, in many cases, by helping to restore the health of the Chesapeake Bay.

Mapping of the Floodplain

Copies of the adopted Flood Insurance Rate Map for Aberdeen may be viewed at City Hall.

HABITATS OF THREATENED AND ENDANGERED SPECIES

Definition

An area that, due to its physical or biological features, provides important elements for the maintenance, expansion, and long-term survival of threatened and endangered species listed in the Code of Maryland Regulations (COMAR). This area may include breeding, feeding, resting, migratory, or overwintering areas. Physical or biological features include (but are not limited to): structure and composition of the vegetation; faunal community; soils, water chemistry and quality; and geologic, hydrologic, and microclimatic factors. This area may need special management or protection because of its importance to conservation of the threatened or endangered species.

Justification for Protection

The Wildlife and Heritage Service of the Maryland Department of Natural Resources tracks the status of over 1,100 native plants and animals that are among the most rare in Maryland. The State law that regulates the listing of endangered species is the Nongame and Endangered Species Conservation Act (Annotated Code of Maryland 10-2A-01). This Act is supported by regulations (COMAR 08.03.08) that include the official list of State Threatened and Endangered Species. The City will pursue all efforts to protect habitats of threatened and endangered species.

TOPOGRAPHY/STEEP SLOPES

Definitions

Topography is defined as the slope gradient of a site expressed as a relationship of vertical feet of elevation over horizontal feet of distance (rise over run) as well as the visual lay of the land. Topography has specific implications for site development. It controls the location of roads, buildings, and utilities. Topography also affects the overall visual character of the site.

Steep slopes are defined as areas with slopes greater than 25%.

Justification for Protection

Slopes provide an environment for movement of soil and pollutants when land disturbance occurs. While soils have varying degrees of erodibility, all are nonetheless subject to movement, and increasingly so as the slope of the land increases.

Preservation of steep slopes adjacent to watercourses is especially important because of the potential harm to water quality and aquatic habitat. The identification and protection of steep slopes within an area helps to protect both the immediate and downstream communities from these hazards.

AGRICULTURAL AND FOREST LANDS INTENDED FOR RESOURCE PROTECTION OR CONSERVATION

Definition

Agriculture is defined as all methods of production and management of livestock, crops, vegetation, and soil. It also includes the activities of feeding, housing, and maintaining of animals such as cattle, dairy cows, sheep, goats, hogs, horses, and poultry.

A forest is a biological community dominated by trees and other woody plants covering a land area of 10,000 square feet or greater. A forest includes areas that have at least one hundred live trees per acre, with at least 50% of those trees having a two-inch or greater diameter at 4.5 feet above the ground. A forest also includes areas that have been cut but not cleared. A forest does not include orchards.

Justification for Protection

In the late 1970s, Harford County began its preservation efforts through programs offered by the Maryland Environmental Trust and the Maryland Historic Trust. In 1982, Harford County began its first agricultural preservation program with the Maryland Agricultural Land Preservation Foundation. In addition, Harford County continues to protect agricultural lands utilizing the Rural Legacy Program and Forest Legacy Program and recently developed a Priority Preservation Area Plan. The City recognizes Harford County's efforts and will work closely to support them on preserving those properties that are designated as a Priority Preservation Area.

The Forest Conservation Act became effective July 1, 1991 and applies to all tracts of land proposed for development and measuring 40,000 square feet or more. Permit requirements under the Act took effect in Aberdeen on February 1, 1993 (Ordinance Number 405-92). Mitigation is required as part of the Aberdeen Forest Conservation Ordinance. For further information refer to the Code of the City of Aberdeen, Chapter 280, Forest Conservation.

HYDROGEOLOGY

Justification for Protection

In 2009, the City of Aberdeen's water supply system served a population of over 14,000 and has over 4,800 connections. The water is currently supplied by 13 wells and supplemented by additional purchases of bulk water from Harford County. In 2000, the City entered into an agreement with the U.S. Army to own and maintain the Chapel Hill Surface Water Treatment Plant. For further information on the City's water supply system refer to Chapter 10 – Water Resource Element.

Aberdeen's 13 wells draw water from the Talbot Formation, which is part of the Coastal Plain sediments of Harford County. The Talbot Formation is within the Quaternary System and functions as an unconfined aquifer in this area. It consists of shallow silt and clay facies, and a deeper gravelly sand facies, interbedded with dark clay layers. The lithology of the Coastal Plain sediments in Harford County is extremely variable and aquifer boundaries do not coincide with formation boundaries.

Aberdeen's wells draw water from an unconfined aquifer. In general, water supplies in unconfined aquifers are susceptible to contamination from land use activities. Therefore, continued routine monitoring of contaminants is essential in assuring a future supply of safe and healthful drinking water.

The City adopted a Wellhead Protection Overlay District and Wellhead Protection Ordinance in 2004, the purpose of which is to protect the groundwater resources of the community public water supply. The designation of the Wellhead Protection Overlay District regulates the permitted and prohibited activities within the district and reduces the potential for groundwater contamination. For further information refer to the Code of the City of Aberdeen, Chapter 524, Wellhead Protection.

CRITICAL AREA

Definition

An area within 1,000 feet of tidal waters and tidal wetlands and any additional areas that are deemed necessary to carry out the Chesapeake Bay Critical Area Act and the Chesapeake Bay Critical Area Program.

Justification for Protection

The State of Maryland has recognized the Chesapeake Bay as an estuarine system of significant importance and has enacted the Chesapeake Bay Critical Area Act and the Chesapeake Bay Critical Area Program. The City has within its corporate limits 92 acres located in a critical area.

These lands are within 1,000 feet of tidal waters and the City is required by the Critical Area Commission to have a Critical Area Program. For further information refer to City Resolution No. 09-R-01 implementing the Chesapeake Bay Critical Area Program.

HISTORICAL SITES

Definition

An historic site shall mean the location of an event of historic significance or a structure, whether standing or ruined, which possesses historic, architectural, archeological, or cultural significance.

Justification for Protection

The Aberdeen Heritage Trust was created by a Resolution of the Aberdeen City Council on April 3, 1998. The City of Aberdeen has 57 structures on the Maryland Inventory of Historic Properties. Two of these structures are also on the National Register of Historic Places. The mission of the Aberdeen Heritage Trust is to safeguard the heritage of the City of Aberdeen, by preserving sites, structures and districts that have historical significance, and to promote preservation and appreciation of these sites, structures, and districts for the education of our community.

The structures/sites listed below are on the Maryland Inventory of Historic Properties:

9 E. Bel Air Avenue
27 E. Bel Air Avenue
31 E. Bel Air Avenue
41 E. Bel Air Avenue
45 E. Bel Air Avenue
201 E. Bel Air Avenue
11 W. Bel Air Avenue
115 W. Bel Air Avenue
200 W. Bel Air Avenue
202 W. Bel Air Avenue
302 W. Bel Air Avenue
B&O Railroad Station, 408 W. Bel Air Avenue
James B. Baker House, 452 W. Bel Air Avenue, circa 1890 (National Register of Historic Places)
468 W. Bel Air Avenue
502 W. Bel Air Avenue
508 W. Bel Air Avenue
514 W. Bel Air Avenue
602 W. Bel Air Avenue
603 W. Bel Air Avenue
610 W. Bel Air Avenue
614 W. Bel Air Avenue
617 W. Bel Air Avenue
619 W. Bel Air Avenue
623 W. Bel Air Avenue
626 W. Bel Air Avenue
627 W. Bel Air Avenue
631 W. Bel Air Avenue
644 W. Bel Air Avenue
653 W. Bel Air Avenue
658 W. Bel Air Avenue
671 W. Bel Air Avenue
681 W. Bel Air Avenue
684 W. Bel Air Avenue
685 W. Bel Air Avenue
210 Edmund Street
7 Holloway Lane
210 S. Law Street
211 S. Law Street
214 S. Law Street
17 Market Street
510 Maxa Road
700 Maxa Road
125 Mount Royal Avenue
214 Paradise Road
252 Paradise Road
269 Paradise Road
271 Paradise Road
471 Paradise Road
485 Paradise Road
493 Paradise Road
1 S. Parke Street
3 S. Parke Street
Poplar Hill, 115 Poplar Hill Road, circa 1749 (National Register of Historic Places)
Grove Cemetery, 95 Post Road
318 Roberts Way
Roberts' Way Cemetery, 345 Roberts Way
12 S. Rogers Street
16 S. Rogers Street

Chapter 9 - HOUSING ELEMENT

The Department of Planning and Community Development completed a Neighborhood Needs Assessment in 2009. The purpose of the assessment was to identify the average age of dwellings, condition of dwellings, property maintenance issues, and parks and recreation opportunities in residential developments. The assessment did not take into consideration apartment complexes or mobile home parks. The City's neighborhoods were divided into eight (8) sectors: Eastern Sector (north and south), Western Sector (north and south), Historic Sector (north and South), and the Central Sector (north and South). The Assessment found that the City offers a variety of housing types and unique architectural styles and that the City's housing stock ranges in age from over 100 years old to new construction.

The City has worked with Harford Habitat for Humanity since 1995 in identifying opportunities for re-development, and has provided assistance in the form of incentives for their re-development efforts. Harford Habitat for Humanity has constructed new single-family dwellings on Baltimore Street, Baltimore Street extended, Darlington Avenue, Elmhurst Street, First Street, Holloway Lane, Moyer Drive, Post Road, Schmechel Street, Schofield Road, Second Street, Third Street, Warren Street, and Washington Street.

Each year, Harford County receives Federal grant funding from the U.S. Department of Housing and Urban Development (HUD) to address housing and community development needs in the County. As part of the requirements for receiving these funds, Harford County must submit a Consolidated Five-Year Plan to HUD. The Consolidated Plan incorporates citizen participation to identify community needs and lays out Harford County's Strategic Plan to address those needs. The current Harford County Consolidated Plan was written to address the five-year period covering fiscal years 2008 through 2012.

In addition to the Consolidated Plan, Harford County produces two additional related reports each year. The Annual Action Plan, distributed each spring, outlines goals for the coming year. The Consolidated Annual Performance and Evaluation Report (CAPER) provide an assessment of program performance and accomplishments by Harford County in the use of its HUD housing and community development entitlement funds during the previous year.

The City receives an annual allocation of Community Development Block Grant (CDBG) funds from Harford County Government. The City has previously used CDBG funds to conduct feasibility and planning studies for public infrastructure improvements, perform road maintenance in low and moderate income communities, and to construct the Boys and Girls Club facility, a skateboard park, and the Senior Citizens Center.

The Harford County Consolidated Plan for fiscal years 2008 to 2012 has progressed in meeting the Affordable Housing goal listed below:

> Affordable Housing – The objective is decent affordable housing and the anticipated outcome is affordability and availability/accessibility through:

- Preservation and rehabilitation of existing housing stock
- Homeownership assistance
- Expansion of affordable rental housing
- Continued support of the County's public and assisted housing programs
- Affirmatively furthering fair housing on a regional level through various County programs

The City and Harford County Government are working with The Shelter Group to construct Winston's Choice, a 22-unit townhouse development to be marketed for workforce housing.

Chapter 2 – Land Use Element further addresses housing needs in the Goals and Objectives section.

Chapter 10 - WATER RESOURCES ELEMENT

INTRODUCTION

In 2006, the Maryland Legislature Session, House Bill 1141 was enacted which required all counties and municipalities to examine their water resources when planning for future growth. The Water Resources Element requires municipalities to perform an analysis of a) potable water systems including supply, treatment, storage, and distribution; b) wastewater systems including collection, treatment, and disposal; and c) stormwater management including point and non-point source loadings. When looking at future growth needs, the City of Aberdeen must address any shortcomings through modifying future land use patterns to eliminate problem areas or provide specific solutions to address any limitations. This chapter, "Water Resources Element", was prepared by Davis, Bowen, and Friedel, Inc., for and with the cooperation of the City of Aberdeen.

The following section examines the City of Aberdeen's existing water resources in conjunction with its current development and planning for future growth. Where necessary, improvements and alternatives to solve any water resource problems are discussed. This section is based on a twenty (20) year planning period with updates every six (6) years.

The City of Aberdeen and Harford County Government has ongoing inter-jurisdictional coordination and cooperation by serving areas outside their jurisdictions on agreed terms and conditions. The City of Aberdeen and Harford County have entered into a Water Service Purchase Contract, also known as the "Bulk Water Agreement", in June of 1995 wherein Harford County has agreed to provide potable water for purchase by the City of Aberdeen. Recently, the agreement was amended for the 6th time in October of 2009 to provide a maximum of 0.9 million gallons per day (MGD) to the City of Aberdeen to serve BRAC related commercial and industrial development within the corporate limits of the City of Aberdeen. An additional 0.6 MGD is anticipated to be available for purchase from the County contingent upon an agreement between the City of Baltimore and Harford County and the City paying a capital charge by June 30, 2011; this could provide a maximum of 1.5 MGD available to the City. The City of Aberdeen may purchase an additional 1.1 MGD of potable water from Harford County in the future, should the City deem in necessary and the County has available capacity to sell; this would be handled through a future amendment to the Bulk Water Agreement.

WATER OVERVIEW:

The City of Aberdeen provides water to through the use of groundwater wells, treatment facility, storage tanks, and various sized distribution lines and booster stations. Currently the City of Aberdeen has a Water Appropriation and Use Permit (WAUP) for its community water system which allows for withdrawal an average of 1.5 MGD on an annual basis and up to 2.0 MGD during the month of maximum use from its sixteen (16) wells. The City of Aberdeen also operates a water treatment facility with a capacity to treat 3.0 MGD of groundwater by disinfecting (chlorine), fluoridation, degasification (forced aeration towers), and pH adjustment

(soda ash). The City of Aberdeen's distribution system is separated into three (3) distinct systems which are operated simultaneously. In conjunction with the distribution system, the City of Aberdeen utilizes three (3) 250,000 gallon storage tanks and one (1) 440,000 gallon storage tank. In general, the City of Aberdeen can provide an average of 1.5 MGD of water from the municipal wells and 0.6 MGD of bulk water from Harford County for a total of 2.1 MGD on an average day. The City of Aberdeen has a maximum daily capacity of 2.0 MGD from municipal wells and 0.9 MGD of bulk water from Harford County for a total of 2.9 MGD. City of Aberdeen current average water demand is 1.485 MGD.

WASTEWATER OVERVIEW:

The City of Aberdeen wastewater system consists of various sized sanitary sewers and pumping stations which collects the City of Aberdeen's wastewater. The wastewater is ultimately received at the City of Aberdeen's Advanced Wastewater Treatment Plant (AWWTP). The AWWTP has a current and permitted capacity of 4.0 MGD with a peak flow capacity of 6.0 MGD. It is currently being upgraded to Enhanced Nutrient Removal (ENR) with an anticipated construction completion date of 2012. This upgrade will not increase the AWWTP's capacity but will improve the treatment process which will allow the City of Aberdeen to remove nutrients such as nitrogen and phosphorus and assist in the initiative to clean up the Chesapeake Bay. The AWWTP currently experiences average sewage flows of 2.23 MGD. Note that the limiting factor for growth within the City of Aberdeen is wastewater treatment capacity due to required nutrient loads that must be met at the AWWTP.

GROWTH PROJECTIONS

The City of Aberdeen has designated seventeen (17) planning areas, including the City of Aberdeen and Aberdeen Proving Ground (APG)[1], leaving 15 planning areas as future growth areas for a total of 8,283.11 acres. These growth areas will be served by public water and sewer either by the City of Aberdeen or by Harford County. Map 10-1: Water Service Areas and Map 10-2: Wastewater Service Areas indicate the Water and Sewer service areas per Harford County's Water and Sewer Master Plan adopted in April of 2010. Future Planning Areas: Bush Chapel, excluding 300 EDUs that are part of the Bosworth and Cornblatt annexations and will be served by the City of Aberdeen; Stepney; and Old Philadelphia would be served by Harford County while Swan Creek, Mullins, Oakington, Pulaski, and Long/Heat would be served by the City of Aberdeen. Future Planning Areas: Barkess, Titan Terrace, Paradise, and Old Robinhood, would be served with both water and sewer by the City of Aberdeen using the water purchased from Harford County through the Bulk Water service agreement. Future Planning Areas: Aldino-Stepney, Gilbert, and Gray are currently mapped as "no planned" service based on the current Harford County Water and Sewer Master Plan. Future Planning Area 17 - Aberdeen Proving Ground is currently served by a separate water and wastewater district, although the treatment plants are operated by the City of Aberdeen. Aberdeen Proving Ground (APG) is not included in the Water and Sewer capacity calculations that are part of Water Resource Element. As part of this comprehensive plan, it is recommended that the City of Aberdeen work with

[1]Future Growth Area Aberdeen Proving Ground (APG) is not included in accessing the impacts on the City's Water resources, Wastewater capacity, or Stormwater runoff; this area is a separate district.

The City of Aberdeen will be planning infrastructure extensions to the growth areas based on the phasing of the growth areas as described in the Municipal Growth Element. The ultimate build-out and planned growth for all growth scenarios are discussed on page 17 of the Water Resource Element.

Excluding existing development within the growth areas, when completely developed, a potential of 34,554 equivalent dwelling units (EDUs)[2] (see Scenario 1 in Table 10-1: Growth Area Summary) is possible of which 30,697 EDUs will be served by the City of Aberdeen and 3,857 EDUs will be served by Harford County. To support this development existing, and infill, based on the average day demand of 250 gallons per day (gpd) per EDU, the City of Aberdeen would need an additional 8.381 MGD of water (10.481 MGD total – 2.1 MGD existing = 8.381 MGD) and 6.481 MGD of wastewater capacity (10.481 MGD total – 4.0 MGD existing = 6.481 MGD). Based on peak day demands, the City will need an additional 13.765 MGD (16.665 MGD total peak – 2.9 MGD existing = 13.765 MGD) of water capacity and 35.9 MGD (41.9 MGD total peak – 6 MGD existing = 35.9 MGD) of wastewater capacity. Currently, the City of Aberdeen has a capacity to withdrawal a maximum of 2.0 MGD from existing wells; treat 3.0 MGD at the water treatment plant along with purchasing maximum of 0.9 MGD of potable water per an agreement currently in place with Harford County. The City of Aberdeen's National Pollutant Discharge Elimination System (NPDES) permit for its Advanced Wastewater Treatment Plant (AWWTP) allows for an average discharge of only 4.0 MGD with a peak capacity of 6.0 MGD.

2 Equivalent Dwelling Unit (EDU) is a measure where one unit is equivalent to water demand or wastewater effluent from one home, which is 250 gallons per day per home (1 EDU = 250 gallons per day). This amount is based on most textbooks and resources estimating an average of 100 gallons of water/wastewater per person and based on the national average home occupancy of 2.5 persons per home.

Table 10-1: Growth Area Summary

Growth Areas	Area	Scenario 1 Ultimate Build out [1]	Scenario 2 City's Planned Growth[2]	Served by[3]
	Acres	EDU	EDU	
Planning Area 1 - Swan Creek[4]	365.44	1,815	300	City Water and Sewer
Planning Area 2 - Mullins[4]	443.43	1,186	0[7]	City Water and Sewer
Planning Area 3 - Oakington[4]	883.88	1,375	0[7]	City Water and Sewer
Planning Area 4 - Pulaski[4]	218.34	738	240	City Sewer/ Bulk Water
Planning Area 5 - Barkess[4,8]	497.85	1,808	1,011	City Sewer/ Bulk Water
Planning Area 6 - Titan Terrace[4,7]	292.64	142	223	City Sewer/ Bulk Water
Planning Area 7 - Old Robinhood[4,7]	515.11	2,665	300	City Sewer/ Bulk Water
Planning Area 8 - Paradise[4,8]	262.59	756	919	City Water and Sewer
Planning Area 9 - Aldino-Stepney[6]	849.53	4,418	2,973	Mapped No Planned Service
Planning Area 10 - Gilbert[6]	564.53	2,467	2,104	Mapped No Planned Service
Planning Area 11 - Long / Heat[4]	294.85	339	400	City Water and Sewer
Planning Area 12 - Grays[6]	838.28	4,359	0[7]	City Water and Sewer
Planning Area 13 - Bush Chapel[5][9]	127.65	300[9]	300[9]	City Water and Sewer
	521.81	3,857[5]	1973 [5]	County Water and Sewer
Planning Area 14 – Stepney[5]	552.75	2,653	0[7]	County Water and Sewer
Planning Area 15 - Old Philadelphia[5]	1054.43	5,676	0[7]	County Water and Sewer
Future Growth Areas	8283.11	34,554	10,743	Total EDU's
		30,697	8,770	EDU's served by City
Planning Area 16 – City of Aberdeen Infill + Existing[4]	4,144	11,230	11,230	City Water and Sewer
Planning Area 17 – APG*[6]	72,518	0	0	
EDUs	84,945.11	45,784	21,973	Total EDU's
		41,927	20,000	EDUs served by City
Water demand/ sewer flows (GPD)[10]		11,446,000	5,493,250	Total demand
		10,481,750	5,000,000	Total City demand

Source: City of Aberdeen

(1)Ultimate build out of growth areas, not including the existing development with higher density to support smart growth principals but includes the existing development within the Planning Area 16 – City of Aberdeen.
(2)Proposed EDU's with restricted densities, not including the existing development in the growth areas. Existing development services will be determined on a case by case basis and will be incorporated into the existing infill EDUs if necessary.
(3)Jurisdiction serving the growth area as mapped by Harford County Water and Sewer Master Plan and illustrated on Map 10-1: Water Service Area and Map 10-2: Wastewater Service Area.
(4) Identified in the City DPW growth areas.
(5) Identified to be provided by Harford County water and wastewater.
(6) Areas mapped as "No Planned Service" in the Harford County Water and Sewer Master Plan but City intend to serve.
(7) Proposed EDU's for these growth areas is zero. Infrastructure extension to these areas is not expected in the near future.
(8) Areas served by the City using the Bulk Water received from the County through agreement recently amended in October of 2009.
(9) Planning Area 13 accounts for the Bosworth & Cornblatt annexations for a total of 300 EDUs which will be served by the City. The remaining EDUs served by the County are not included in the Water and Sewer capacity calculations but are included in the Stormwater runoff calculations that are part of Water Resource Element.
(10) New water and sewer demand was determined by 250 gpd/EDU.
* Aberdeen Proving Ground (APG) is included as Planning Area 17 but this area is not included in the Water and Sewer capacity calculations or Stormwater runoff calculations that are part of Water Resource Element.

However, the City of Aberdeen is only planning for a potential of 10,743 EDU's in its growth areas (see Scenario 2 in Table 10-1: Growth Area Summary), of which 8,770 EDUs will be served by the City of Aberdeen and 1,973 EDUs will be served by Harford County and therefore this Water Resource Element evaluates only the City's demand, capacity and limitations based on 8,770 EDU's. The City of Aberdeen's existing and infill development and its planned growth areas, with 20,000 EDU's (11,230 EDU's existing and infill, and 8,770 EDU's in growth areas), will result in average daily water usage of 5.0 MGD, of which 2.901 MGD of new demand will be served by the City of Aberdeen, 0.613 MGD of new demand will be served by the City of Aberdeen using the bulk water purchased from the Harford County; note that 0.493 MGD (water for 1,973 EDUs in the Bush Chapel area) of new demand will be served by Harford County; see Table -2 and detailed water calculations found later in the appendix. Currently the City of Aberdeen's average water demand is at 70.7% of its capacity (total well production + County bulk water) and will exceed its capacity with the planned growth based on Scenario 2, the City's chosen growth scenario. The water usage for the City of Aberdeen reaches 80% of its capacity with an additional 780 EDUs. At such point, and as recommended by MDE, the City of Aberdeen should complete a Water Capacity Management Plan and begin planning for additional potable water to meet increasing demand. Such options could include, but not limited to, increasing purchase of water from the Harford County or use of surface water. The City of Aberdeen can provide an average of 1.5 MGD of water and utilize 0.6 MGD bulk water from Harford County with an average safe yield capacity of 2.1 MGD of water; however this is not adequate for the required 5.0 MGD based on the chosen growth scenario, Scenario 2.

A potential increase of 3.156 MGD in wastewater flows would be realized under the planned 8,770 EDU's growth scenario as well. The City of Aberdeen and its growth areas will result in an average wastewater flow of 5.0 MGD, of which will be served by the Aberdeen AWWTP; note that 0.493 MGD (wastewater from 1,973 EDUs in the Bush Chapel area) will be served by Harford County; see Table -3 and detailed water calculations found later in the appendix. Currently the AWWTP is operating at 46.1% of its capacity. As the AWWTP reaches 80% of its capacity, and as recommended by MDE, the City should complete a Wastewater Capacity Management Plan and begin the planning process to increase its capacity to the required 5.0 MGD; an additional 5,424 EDU's will put the existing AWWTP at 80% capacity or 3.2 MGD. Possible options could include a capacity upgrade of the existing AWWTP, process modifications of the existing AWWTP that will further enhance the treatment and further reduce the nutrients which may subsequently increase permitted capacity, investigate alternate disposal methods such as spray irrigation, and/or investigate obtaining nutrient credits for additional capacity by connecting existing onsite sewage disposal systems to the City's AWWTP, wetland restoration, water reuse, oyster banking, algal farming.

WATER RESOURCES

Groundwater Sources

The City of Aberdeen's groundwater is harvested from the Talbot Formation which is part of Coastal Plain sediment of Harford County. The Talbot Formation is within the Quaternary System and functions as an unconfined aquifer in this area. The aquifer consists of shallow silt and clay facies and a deeper gravelly sand facies interbedded with dark clays. The lithology of the Coastal Plain sediments in Harford County is extremely variable and aquifer boundaries do not coincide with formation boundaries.

The City of Aberdeen currently uses sixteen (16) wells within the community water system to supply water to the public water distribution system. These wells draw water from the Quaternary aquifer. In general, water supplies in unconfined aquifers are susceptible to contamination from land use activities. Therefore, continued routine monitoring of contamination is essential in assuring a future supply of safe and healthful drinking water. When the City of Aberdeen published the "Annual Drinking Water Quality Report" for 2009, the report stated there were no violations of Environmental Protection Agency's (EPA) Maximum Contaminant Levels (MCL).

Private Wells

It is estimated that there are six (6) private wells within the City of Aberdeen that are in use. The City has no plans on connecting these properties to the City distribution system at this time however will be willing to should these wells fail and/or the property owners request to connect.

The City of Aberdeen adopted a Wellhead Protection Ordinance in September 2004. It is recommended that the City of Aberdeen periodically review the Wellhead Protection Plan to ensure potential source water contamination causes are being avoided as well as monitoring of water quality in the supply wells as necessary although there are no water quality issues at this time. The City of Aberdeen is reviewing the Wellhead Protection Ordinance and Zone Area maps and will be updating this to incorporate the Harford County wellhead Protection Area for the Perryman well field as well.

The purpose of the Wellhead Protection Plan as described in the City's Wellhead Protection Ordinance is to:

- Delineate the area contributing water to the source.
- Provide an overview of the susceptibility of the source to contaminants.
- Identify actual and potential sources of contamination within the contributing area.
- Provide a management plan to address activities and properties that threaten the source.
- Provide monitoring practices that will provide early warning of impending problems.
- Provide a contingency plan to address threats and maintain the water supply quality.
- Educate the public on the need to protect the source.

Surface Water Sources

The City of Aberdeen also receives water from Harford County which has contractual relationship for a temporary water purchase from the City of Havre de Grace. Harford County also owns and operates a treatment plant in City of Havre de Grace. Water supply to the City of Havre de Grace Water treatment plant and the County's City of Havre de Grace Treatment plant both come from the Susquehanna River, however, they have two different treatment processes. An agreement, as amended in October of 2009 between the City of Aberdeen and Harford County, allows for the purchase of up to 0.9 MGD of potable water on a peak day from the County system.

Well Production

Based on the City of Aberdeen's well production data from January 2005 through December 2009, the average daily well production was approximately 1.191 MGD. Wells #1 through #6, #11, #12, and #15 are located east of the Amtrak railway at the southeastern boundary of the City limits, and Wells #7 through #10 are located on the west side of Gadsden Road, Aberdeen Proving Ground. All wells combined have a maximum capacity of approximately 3.061 MGD which exceeds the permitted average and maximum month average day limit. Assuming the largest well is out of service, a safe yield capacity of 2.571 MGD can be realized. For planning purposes, the month of maximum use (July) is used to determine the well capacity required. In July 2009, the wells produced an average of approximately 1.214 MGD.

Accounting for infill and lots that have either been approved or are pending approval, the City of Aberdeen is currently reserving capacity for 945 EDUs which equates to 0.236 MGD. The City of Aberdeen is planning for 5,290 EDUs, including the 945 EDUs in reserve, within the current incorporated boundary and for the existing homes within the planning areas[3] for a total additional water demand of 1.322 MGD. As previously stated, all growth areas, when completely developed, have a development potential of 34,554 EDU's. However, the City of Aberdeen is only planning for a potential of 8,770 EDUs in its growth areas. The City of Aberdeen can expect an increase of 4.008 MGD for a future average daily water demand and 6.373 MGD peak water demand for the projected growth in all growth areas including infill.

Of the total 5.00MGD average day future demand, 0.613 MGD comes from areas that are to be served under the Bulk Water agreement with Harford County, and 1.269 MGD comes from an area that is mapped as "no planned service" per the Harford County Master Plan for Water and Sewer. Only 1.632 MGD of future average demand and 2.595 MGD of future peak demand is slated for areas that are mapped to be served by the City of Aberdeen.

Based on the Table 10-2, areas to be served by the City of Aberdeen, including bulk water areas, result in an average day demand of 5.00 MGD with a peak demand of 7.950 MGD. The City of Aberdeen wells are only permitted to withdrawal an average day of 1.50 MGD with a maximum month average of 2.0 MGD, however with the largest well out of service; the wells are capable of withdrawing 2.572 MGD. Taking into account the maximum allowable water related to the bulk water agreement, 0.9 MGD, and maximum permitted withdrawal, 2.0 MGD, the City of

[3] Connecting existing users to into the City of Aberdeen system will be evaluated on case by case and will utilize the infill allocations.

Aberdeen's total peak water capacity equates to 2.90 MGD; this results in a deficit of 5.050 MGD or 16,160 EDU's. The City of Aberdeen would require additional well capacity of 3,507 GPM (gallons per minute), purchase of additional bulk water from Harford County to meet the projected future demand, and/or additional surface water of their own.

As stated earlier, current City's average day water demand is at 70.7% of its capacity (total well production + County bulk water) and will reach 80% of its capacity by adding 780 EDU's to their current demand. Based on the historical growth rate of 2% per annum, City's average day water demand will reach 80% of its available water resources around the year 2015. Based on the same growth assumptions, City of Aberdeen's average day water demand will reach 100% of its available water resources around the year 2025 or by adding 2,460 EDU's.

The City of Aberdeen has explored supplementing its water supply through the addition of groundwater wells in the area adjacent to the Department of Public Works building. This effort was abandoned when the hydrogeoloist identified significant potential for contamination in the recharge area.

Table 10-2: Water Demand for the City of Aberdeen and Proposed Growth Areas

Location	EDU	City[4]		No Planned Service[6]		County[5]		Bulk Water [9]		City +No Planned Service + Bulk		Total	
		A.D[1] (gpd)	P D[2] (gpd)	A.D[1] (gpd)	P.D[2] (gpd)	A.D[1] (gpd)	P.D[2] (gpd)	A.D[1] (gpd)	P.D[2] (gpd)	A.D[1] (gpd)	P.D[2] (gpd)	A.D[1] (gpd)	P.D[2] (gpd)
Area 16: City of Aberdeen Existing[3]	5,940	1,485,000	2,361,150	0	0	0	0	0	0	1,485,000	2,361,150	1,485,000	2,361,150
Area 16: City of Aberdeen Infill	5,290	1,322,500	2,102,775	0	0	0	0	0	0	1,322,500	2,102,775	1,322,500	2,102,775
Area 1 - Swan Creek[4]	300	75,000	119,250	0	0	0	0	0	0	75,000	119,250	75,000	119,250
Area 2 - Mullins[4,7]	0	0	0	0	0	0	0	0	0	0	0	0	0
Area 3 - Oakington[4,7]	0	0	0	0	0	0	0	0	0	0	0	0	0
Area 4 - Pulaski[4]	240	60,000	95,400	0	0	0	0	0	0	60,000	95,400	60,000	95,400
Area 5 – Barkess[4,9]	1,011	0	0	0	0	0	0	252,750	401,873	252,750	401,873	252,750	401,873
Area 6 - Titan Terrace[4,9]	223	0	0	0	0	0	0	55,750	88,643	55,750	88,643	55,750	88,643
Area 7 - Old Robinhood[4,9]	300	0	0	0	0	0	0	75,000	119,250	75,000	119,250	75,000	119,250
Area 8 - Paradise[4,9]	919	0	0	0	0	0	0	229,750	365,303	229,750	365,303	229,750	365,303
Area 9 - Aldino-Stepney[6]	2,973	0	0	743,250	1,181,768	0	0	0	0	743,250	1,181,768	743,250	1,181,768
Area 10 - Gilbert[6]	2,104	0	0	526,000	836,340	0	0	0	0	526,000	836,340	526,000	836,340
Area 11 - Long / Heat[4]	400	100,000	159,000	0	0	0	0	0	0	100,000	159,000	100,000	159,000
Area 12 - Grays[6,7]	0	0	0	0	0	0	0	0	0	0	0	0	0
Area 13 - Bush Chapel[4,5]	300[4]	75,000	119,250	0	0					75,000	119,250	75,000	119,250
	1,973[5]					493,250	784,268	0	0	0	0	493,250	784,268
Area 14 - Stepney[5,7]	0	0	0	0	0	0	0	0	0	0	0	0	0
Area 15 - Old Philadelphia[5,7]	0	0	0	0	0	0	0	0	0	0	0	0	0
Area 17: Aberdeen Proving Ground*	0	0	0	0	0	0	0	0	0	0	0	0	0
New Demand	**16,033**	**1,632,500**	**2,595,675**	**1,269,250**	**2,018,108**	**493,250**	**784,268**	**613,250**	**975,068**	**3,515,000**	**5,588,852**	**4,008,250**	**6,373,118**
Total (Existing + New)	**21,973[8]**	**3,117,500**	**4,956,825**	**1,269,250**	**2,018,108**	**493,250**	**784,268**	**613,250**	**975,068**	**5,000,000**	**7,950,002**	**5,493,250**	**8,734,268**

(1) Average Day (A.D) demand determined as 250 gpd/EDU.
(2) Peaking Factor of 1.59 as determined from City records from January 2005 through December 2009 and is used to determine Peak Day (P.D) demand.
(3) Existing EDUs based on average daily demand for years 2005 – 2009 divided by 250 gpd/EDU.
(4) Identified in City DPW growth areas.
(5) Identified to be provided by County water.
(6) Areas mapped as "No Planned Service" in the Harford County Water and Sewer Master Plan.
(7) Proposed EDU's for these growth areas is zero. Infrastructure extension to these areas is not expected in the near future.
(8) 21,973 Total EDU's include 1,973 EDUs to be served by the County leaving 20,000 EDUs to be served by the City of Aberdeen.
(9) Areas served by the City using the bulk water received from the County through agreement recently amended in October of 2009.
* Aberdeen Proving Ground is included as Planning Area 17 but this area is not included in the Water and Sewer capacity calculations or Stormwater runoff calculations that are part of Water Resource Element.

Water Appropriations & Use Permit

The City of Aberdeen's Water Appropriation and Use Permit (WAUP) for the community water system allows for withdrawal an average of 1.5 MGD on an annual basis and up to 2.0 MGD can be drawn from the aquifer during the month of maximum use. Based upon the withdrawal limits and required water demands listed above, an increase in the allowable appropriations permitted by the current WAUP would be needed in order for the City to meet future growth needs. The City should continue to monitor water usage to indicate when an increase in the existing permit may be needed. Should this increase not be obtainable from the Maryland Department of Environment (MDE), the City of Aberdeen would need to further investigate the likelihood of utilizing surface water or purchase additional water from Harford County.

Water Treatment

Based on the information provided in the City of Aberdeen 2009 Annual Drinking Water Quality Report and the Harford County Water and Sewer Master Plan, several of the wells are adversely impacted by perchlorate, a chemical that has been traced to activity at the Aberdeen Proving Ground complex since 2002. The wells principally affected were Wells #3, #8 and #9. A perchlorate removal treatment system consisting of ion-exchange filters have been installed at these wells in June 2004. Since then, these wells had no issues with the perchlorate. Presently, Well #10 has traces of perchlorate and the City is studying a treatment plan to remove perchlorate.

Perchlorate is an unregulated contaminant that is an ingredient in a variety of products including air bag inflators, electronic tubes, lubricating oils, rocket propellant, explosives, and other commercial and agricultural applications. Environmental Protection Agency (EPA) does not have a standard established for perchlorate. Maryland Department of Environment is working with the City of Aberdeen in establishing and maintaining levels of perchlorate in the finished water less than 1.00 ppm (parts per million) and minimizing/eliminating the contaminations.

The existing Aberdeen water treatment facility has the capacity to treat 3.0 MGD through the use of disinfection (chlorine), fluoridation, degasification (forced aeration towers) and pH adjustment (soda ash) for all groundwater sources. Should an increase in well production beyond the treatment plant's rated capacity occur in the future, additional water treatment capacity would be required in order to maintain the high water quality already provided. The City of Aberdeen should monitor the water quality and the treatment capacity as the demand for water increases with growth.

Currently, City's average day water demand is at 49.5% of its treatment capacity and will reach 80% of its capacity by adding 3,660 EDU's to their current demand. Based on the historical growth rate of 2% per annum, City's average day water demand will reach 80% of its treatment capacity around the year 2035. Based on the same growth assumptions, City of Aberdeen's average day water demand will reach 100% of its treatment capacity around the year 2045 or by adding 6,060 EDU's.

Storage

"Water Storage" is defined by Ten State Standards[4] as the storage held in the elevated storage tanks combined with the production from wells with a backup power source. Storage for the community system is provided by three elevated storage tanks each with a capacity of 250,000 gallons and one standpipe with a capacity of 440,000 gallons for a total of 1.19 million gallons. The City of Aberdeen is also planning to construct a 400,000 gallon elevated storage tank to serve existing development in the service area north of I-95. The City of Aberdeen currently operates sixteen (16) wells with a combined pumping ability of 2,126 gallons per minute (GPM). Nine (9) of the City's sixteen (16) wells have back-up power for pumping water for a total pumping capacity of 1,445 GPM. Water storage for the City of Aberdeen is calculated as 2.230 MGD (1.19 MGD tank capacity + 1.040 MGD average day pumping capacity of wells with backup power). The City of Aberdeen would like to meet its average day demand of a peak month as well as a fire flow of 2,500 GPM for 3 hours. The current total water demand for the City of Aberdeen is 2.274 MGD (average day of peak month demand 1.824 MGD + fire flow of 450,000 gallons) and its total Water capacity is 2.796 MGD (2.230 MGD Storage + 0.9 MGD bulk water from the County). The City of Aberdeen currently has a deficit of 43,290 gallons.

As shown in the attached water calculations, the future average day demand for a peak month is 4.426 MGD bringing the total water demand to 6.250 MGD. With the new projected water demand, the City of Aberdeen will have a deficit of 3.903million gallons. The City of Aberdeen would need an additional storage capacity of 3.903 million gallons to meet the projected future water demand. The City of Aberdeen's plan to construct a 400,000 gallon elevated tank will eliminate the current deficit and yield a surplus of 356,710 gallons or 1,427 EDU's. Again, based on the historical growth rate of 2% per annum, City will need additional storage by the year 2020. City of Aberdeen should monitor the growth within the system carefully and plan to add additional storage as growth occurs.

Water Distribution System

The City of Aberdeen currently operates three (3) water distribution systems simultaneously. The main community system serves the majority of the incorporated area. It consists of 8-inch and 12-inch cast iron transmission mains. Water is pumped from the water treatment plant or is delivered through the connections with Harford County or the Aberdeen Proving Ground water system to the first service zone. There are two (2) elevated storage tanks, each with a capacity of 250,000 gallons in zone one, with one (1) tank located near the water treatment facility in the southeastern section of the City and the second tank is centrally located in the western area.

Within the first service zone, Swan Meadows Development originally an Aberdeen Proving Ground housing project, built in 1940's, was accepted into the City of Aberdeen's system in 1970's. This development has various infrastructure problems, including periodic breaks in the water system due to system pressures, flooding of stormwater system during high storm events

[4] Recommended Standards for Water Works commonly referred to as the Ten States Standards is a water facilities design document prepared and updated jointly by a board including ten mid-western states and the Province of Ontario. Ten State Standards was first published in 1953, and subsequently has been revised and published in 1962, 1968, 1976, 1982, 1987, 1992, 1997, 2003 and 2007. These Ten State Standards are adopted as guidelines for other states while designing and/or evaluating a water supply.

due to aging pipe network and swales. The City of Aberdeen contacted Arro Consulting, Inc. to prepare conceptual plan for improvements of the infrastructure and phasing plan for the proposed improvements. The City of Aberdeen also applied to receive funding through Defence Base Closure and Realignment Commission (BRAC) Zone priorities. As funding becomes available, the City of Aberdeen should implement the recommendations to improve the infrastructure in this area.

The second service zone created in 1955 serves the northern sections of the City. This zone is comprised of mostly residential communities, but also includes the commercial area along Bel Air Avenue, the Aberdeen Middle School, and the Maryland House complex located west of the City along the I-95.

The third service zone serves areas north of I-95 that consists of the Higher Education and Applied Technology (HEAT) Center and Ripken Stadium Complex. This zone gets its water supply from the second zone via the HEAT Center Booster Station. This station provides two booster pumps with a capacity of 300 GPM each plus 1,500 GPM fire pump. According to the Harford County Water and Sewer Master Plan, additional development in the area will require a 500,000 gallon elevated storage tank to satisfy diurnal demands, fire flow storage, and reliability of service to this area. The City of Aberdeen is currently in the process of undertaking construction of a 400,000 gallon elevated storage tank to serve this zone.

HEAT is served by the City of Aberdeen through a 12-inch diameter water main which serves only the HEAT Center due to its positive economic, educational, and economic uses in which it provides Harford County. Water service is provided from a water storage tank located on the HEAT Center site. Any further annexation or expansion of water service in the area, particularly the west side of Gilbert Road, must be provided with a new water distribution system.

The City of Aberdeen assesses its pressures and fire flows within the community water system by flushing all the hydrants annually and adjusting the short cycles to meet the fire flows as well as utilizing a comprehensive hydraulic water model of the systems. It is recommended that the City of Aberdeen continue to perform the flushing and maintain the water model to identify any pressure and/or flow deficiencies as well as identify the need for new or upgraded water mains as they relate to future growth.

Water Summary

The City Aberdeen currently has sufficient water supply capabilities to accommodate the current population with the sixteen (16) existing wells, four (4) existing storage tanks, one (1) new storage tank, and the bulk water purchased from the Harford County. However, with the planned growth of 8,770 EDUs in the growth areas and 5,290 EDU's of infill, the City of Aberdeen will need an additional, 2.90 MGD of water, 3,507 gpm of well capacity and 3.903 million gallons of storage capacity. The City will be adopting a water allocation policy/ordinance to address allocation of water for future growth. The City will need to closely monitor growth to determine when additional well capacity and/or storage would be needed. With groundwater sources and bulk water purchases limited, the City could explore their own surface water/desalination water treatment plant to supplement needed water for growth.

At the historical growth rate of 2% per annum, City of Aberdeen's average day water demand will reach 80% of its available water resources around the year 2015 or by adding 780 EDU's and will reach 100% around the year 2025 or by adding 2,460 EDU's. City's average day water demand will reach 80% of its treatment capacity around the year 2035 and will reach 100% around the year 2045 or by adding 6,060 EDU's. Again, based on the historical growth rate of 2% per annum, City will need additional storage by the year 2020.

WASTEWATER CAPACITY

Wastewater Treatment

The City of Aberdeen owns and operates a wastewater treatment facility located at the end of Michaels Lane. Sewage is treated to a tertiary level utilizing primary treatment, two stage activated sludge biological nutrient removal (BNR) process, phosphorous removal, chlorination, dechlorination, chemical addition, anaerobic sludge digestion, and sludge composting utilizing the extended pile method. The effluent is discharged into Swan Creek. The treatment facility has a 4.0 MGD permitted capacity and a peak flow capacity of 6.0 MGD. The plant currently experiences average sewage influent flows of 2.23 MGD with instantaneous peak flows as high as 8.425 MGD during storm events.

Currently, the City of Aberdeen is in the process of upgrading the wastewater treatment facility in order to achieve Enhanced Nutrient Removal (ENR). Design phase of this upgrade was started in April 2008 with a completion date in 2012 and ENR treatment levels achieved by January of 2013. The City of Aberdeen's future growth is also limited by Total Maximum Daily Loads (TMDL's) in the Swan Creek where the WWTP discharges effluent.

Wastewater Flows

Between January 2005 and December 2009 the City of Aberdeen's Advanced Wastewater Treatment Plant (AWWTP) experienced an average influent flow of 2.23 MGD. In 2009, the average daily influent flow was approximately 2.249 MGD.

The City of Aberdeen experienced an average of 1.844 MGD effluent flow between January 2005 and December 2009 or approximately 46% of the plant's overall permitted capacity. The City of Aberdeen's maximum one day effluent flow from 2005 through 2009 was 8.51 MGD in December 2009. Currently the AWWTP has been meeting its current effluent limits and has been within allowable flows.

As shown in Table 10-3, proposed growth of 8,770 EDU's in the growth areas and 3,854 EDU's of infill along with existing flows will result in an average daily wastewater flow of 5.00 MGD; note that per the Harford County Water and Sewer Master Plan adopted in April of 2010, approximately 1,973 EDU's or 0.493 MGD in Bush Chapel growth areas will be served by the County WWTP. Therefore taking into account the growth areas, infill, and areas identified by the Harford County Water and Sewer Master Plan as "no planned service", an additional 3.156MGD will flow to the City of Aberdeen's AWWTP resulting in the projected total average flow of 5.0 MGD. Based on the average flow data, with the additional growth, the City's AWWTP will not meet its current effluent limits and the peak flows of 20.774 MGD will far

exceed the City of Aberdeen's AWWTP Peak flow limits of 6.0 MGD. The City's projected maximum day flows are 14.774 MGD or 14,774 EDU's more than the AWWTP can currently handle.

Part of the 5.0 MGD average day flow, 1.269 MGD comes from the area that is mapped as "no planned service" (Aldino-Stepney and Gilbert) by the Harford County Water and Sewer Master Plan. The City of Aberdeen is recommended to work with Harford County to map these areas as to be served in the future.

As the AWWTP reaches 80% of its capacity, as recommended by MDE, the City should complete a Wastewater Capacity Management Plan begin the planning process to increase its capacity; an additional 5,424 EDU's will put the existing AWWTP at 80% capacity or 3.2 MGD. Possible options could include a capacity upgrade of the existing AWWTP, process modifications of the existing AWWTP that will further enhance the treatment and further reduce the nutrients which may subsequently increase permitted capacity, obtain nutrient credits by connecting existing onsite sewage disposal systems to the City's AWWTP, wetland restoration, water reuse, oyster banking, algal farming, and investigation into alternate disposal methods such as spray irrigation.

At the historical growth rate of 2% per annum, AWWTP will reach 80% of its capacity around the year 2035 and will reach 100% of its capacity around the year 2060 after adding 8,624 EDU's.

Table: 10-3: Wastewater Flows for the City of Aberdeen Growth Area

Location		EDU	City[4]		County[6]		No Planned Service[6]		Total AWWTP Flows (City+ No Planned Service)		Total Wastewater Flows	
			A. D[1] (gpd)	P D[2] (gpd)	A. D[1] (gpd)	P D[2] (gpd)	A. D[1] (gpd)	P D[2] (gpd)	A. D[1] (gpd)	P D[2] (gpd)	A. D[1] (gpd)	P D[2] (gpd)
Area 16: City of Aberdeen	Existing[3]	7,376	1,844,000	8,150,000	0	0	0	0	1,844,000	8,150,000	1,844,000	8,150,000
	Infill	3,854	963,500	3,854,000	0	0	0	0	963,500	3,854,000	963,500	3,854,000
Area 1 - Swan Creek[4]		300	75,000	300,000	0	0	0	0	75,000	300,000	75,000	300,000
Area 2 - Mullins[4,7]		0	0	0	0	0	0	0	0	0	0	0
Area 3 - Oakington[4,7]		0	0	0	0	0	0	0	0	0	0	0
Area 4 - Pulaski[4]		240	60,000	240,000	0	0	0	0	60,000	240,000	60,000	240,000
Area 5 - Barkess[4]		1,011	252,750	1,011,000	0	0	0	0	252,750	1,011,000	252,750	1,011,000
Area 6 - Titan Terrace[4,]		223	55,750	223,000	0	0	0	0	55,750	223,000	55,750	223,000
Area 7 - Old Robinhood[4]		300	75,000	300,000	0	0	0	0	75,000	300,000	75,000	300,000
Area 8 - Paradise[4]		919	229,750	919,000	0	0	0	0	229,750	919,000	229,750	919,000
Area 9 - Aldino-Stepney[6]		2,973	0	0	0	0	743,250	2,973,000	743,250	2,973,000	743,250	2,973,000
Area 10 - Gilbert[6]		2,104	0	0	0	0	526,000	2,104,000	526,000	2,104,000	526,000	2,104,000
Area 11 - Long / Heat[4]		400	100,000	400,000	0	0	0	0	100,000	400,000	100,000	400,000
Area 12 - Grays[6,7]		0	0	0	0	0	0	0	0	0	0	0
Area 13 - Bush Chapel		300[4]	75,000	300,00					75,000	300,00	75,000	300,00
		1,973[5]	0	0	493,250	1,973,000	0	0	0	0	493,250	1,973,000
Area 14 - Stepney[5,7]		0	0	0	0	0	0	0	0	0	0	0
Area 15 - Old Philadelphia[5,7]		0	0	0	0	0	0	0	0	0	0	0
Area 17: Aberdeen Proving Ground*		0	0	0	0	0	0	0	0	0	0	0
New Flows		**14,597**	**1,886,750**	**7,547,000**	**493,250**	**1,973,000**	**1,269,250**	**5,077,000**	**3,156,000**	**12,624,000**	**3,649,250**	**14,597,000**
Total Flows (Existing + New)		**21,973[8]**	**3,730,750**	**15,697,000**	**493,250**	**1,973,000**	**1,269,250**	**5,077,000**	**5,000,000**	**20,774,000**	**5,493,250**	**22,747,000**

(1) Average Day Flows determined by 250 gpd/EDU.
(2) Standard Peaking Factor of 4.0 used for infill and all new development to determine the Peak Day (P.D) flow.
(3) Existing EDUs based on average daily flows for years 2005 – 2009 divided by 250 gpd/EDU.
(4) Identified in City DPW growth areas.
(5) Identified to be provided by County sewer.
(6) Areas mapped as "No Planned Service" in the Harford County Master and Water Sewer Plans.
(7) Proposed EDU's for these growth areas is zero. Infrastructure extension to these areas is not expected in the near future.
(8) 21,973 Total EDU's include 1,973 EDUs to be served by the County leaving 20,000 EDUs to be served by the City of Aberdeen.
* Aberdeen Proving Ground is included as Planning Area 17 but this area is not included in the Water and Sewer capacity calculations or Stormwater runoff calculations that are part of Water Resource Element.

Nutrient Loads

A Tributary Strategy for the Chesapeake Bay Watershed developed in 2004 as a result of 2000 Chesapeake Bay Agreement has become the standard to which cleanup efforts of the Bay are proceeding. This strategy envisions Enhanced Nutrient Removal (ENR) levels of treatment attained by all the major wastewater treatment plants in the State of Maryland discharging into the Chesapeake Bay and its waterways. Currently, Maryland Department of the Environment (MDE) is adding language to the discharge permits such that the annual load of nitrogen and phosphorous is limited at each of the major plants.

The City of Aberdeen's current wastewater treatment plant is designed to remove nitrogen and phosphorus through a Biological Nutrient Removal (BNR) process. The City of Aberdeen discharges an average of 22,453 lbs/year of nitrogen and 1,684 lbs/year of phosphorus. Once the current ENR upgrade is complete, the strict permit limits of 48,729 lbs/year of nitrogen and 3,655 lbs/year of phosphorus as required by the Maryland Department of the Environment will be enacted.

The planned ENR upgrades will limit the AWWTP to discharge total nitrogen at 4 mg/L for a total of 48,729 lbs/year and 0.3 mg/l of phosphorus for a total of 3,655lbs/year of phosphorus at a the permitted capacity of 4.0 MGD. With the planned growth of 8,770 EDU's, the City of Aberdeen's AWWTP will be discharging 60,882 lbs/year of nitrogen, an excess of 12,153 lbs/year, and 4,566 lbs/year of phosphorus, an excess of 901 lbs/year.

If the City of Aberdeen determines that a 5.0 MGD wastewater treatment plant is needed to meet the needs of future growth, the required nutrient limits would need to be lowered to 3.2 mg/l for total nitrogen and 0.241 mg/l of total phosphorus in order to meet the permitted nutrient loading limits for the AWWTP. If the treatment plant cannot reduce the nutrient levels to 3.2 mg/l for total nitrogen and 0.241 mg/l of total phosphorus or unable to increase the capacity of the treatment plant, City should investigate into obtaining nutrient credits for additional capacity by connecting existing onsite sewage disposal systems to the City's AWWTP, wetland restoration, water reuse, oyster banking, algal farming, and investigation into alternate disposal methods such as spray irrigation to abide to the Total Maximum Daily Load (TMDL) limits.

Inflow and Infiltration

The peak factor for a treatment plant is determined by examining the actual flows the plant received over the years. The City of Aberdeen AWWTP peaks flows between January 2005 and December of 2009 were extremely high due to wet weather and result in a actual peak factor of 4.42. Such high flows are possible due to inflow and infiltration (I&I) problems that the treatment plant is experiencing. The inflow and infiltration problems are also evident by examining the water supplied by the City and the wastewater received by the AWWTP. To identify the sources of the problem the City of Aberdeen is currently performing sewer inspections to identify I&I problems and also to identify aging sewer mains throughout the wastewater collection system.

The repairs to the collection system would ultimately reduce I&I which in turns reduces the overall flow to the wastewater treatment facility. This section does not take into consideration any further reductions in average daily flows based on I&I repairs. It should be further noted that further

reductions in average daily flows are expected as the system undergoes repairs. The City of Aberdeen should review the work related to reducing I&I every six years to determine what gains are due to weather and what flow decreases can be contributed to repairs within the collection system.

Swan Meadows Development, now part of the City of Aberdeen, has infrastructure problems, including infiltration and inflow problems in the sewer system. The City of Aberdeen contacted Arro Consulting, Inc. to prepare conceptual plan for improvements of the infrastructure and phasing plan for the proposed improvements. As funding becomes available, the City of Aberdeen should implement the recommendations to improve the infrastructure and rectify the infiltration and inflow problems.

Septic Systems

There are 16 properties within the City of Aberdeen corporate limits which currently operate on septic systems. The City of Aberdeen is currently attempting to convert private septic systems to the centralized wastewater collection system for all properties within the City limits.

Wastewater Summary

Based on this review, the City of Aberdeen does not have the necessary capacity at the AWWTP to accommodate future planned growth and also meet limitations set within the discharge permit even after the treatment plant is upgraded to include ENR treatment. Additional infrastructure improvements will continue to be necessary to provide public sewer service to the designated growth areas and reduce I&I.

At the historical growth rate of 2% per annum, AWWTP will reach 80% of its capacity around the year 2035 and will reach 100% of its capacity around the year 2060. The City of Aberdeen should monitor growth to ensure that system capacity is sufficient. If the capacity is reaching its maximum limits, the City of Aberdeen should investigate additional discharge methods such as spray irrigation and point source trading such as discharge credits and trading consistent with MDE's Wastewater Capacity Management Plan Guidance.

HYPOTHETICAL BUILD-OUT SCENARIO

The following build-out discussion takes into consideration the water needs and wastewater capacity needs the City of Aberdeen will have if all growth areas are fully developed, as well as all properties with development capacity within the existing corporate limits. Please keep in mind that this scenario is not expected to occur within the 2030 planning period of this Comprehensive Plan.

According to the City of Aberdeen projections and anticipated future residential projects, at full build out approximately 3,854 EDUs could be added within the City of Aberdeen. Accounting for infill and lots that have either been approved or are pending approval, the City is currently reserving capacity for 945 EDUs, this equates to 963,500 GPD. All growth areas, when completely developed, have a development potential of 34,554 EDU's. However, the City is only planning for a potential of 10,743 EDU's, of which 8,770 EDUs will be served by the City of Aberdeen and

1,973 EDUs will be served by Harford County, in its growth areas because of the infrastructure limitations.

To support this development, based on the average day demand of 250 gallons per day (gpd) per EDU, the City of Aberdeen would need an additional 2.9 MGD of water and 1 MGD of wastewater capacity. Currently, the City of Aberdeen has a capacity to withdrawal a maximum of 2.0 MGD from existing wells; treat 3.0 MGD at the water treatment plant along with purchasing maximum of 0.9 MGD of potable water per an agreement currently in place with Harford County. The City of Aberdeen's National Pollutant Discharge Elimination System (NPDES) permit for its Advanced Wastewater Treatment Plant (AWWTP) allows for an average discharge of only 4.0 MGD.

At the historical growth rate of 2% per annum, City of Aberdeen's average day water demand will reach 80% of its available water resources around the year 2015 and will reach 100% around the year 2025. City's average day water demand will reach 80% of its treatment capacity around the year 2035, will reach 100% around the year 2045 and the City will need additional storage by the year 2020.

Even with the projected 8,770 EDU's, City of Aberdeen needs to expand its treatment capacity from 4.0 MGD to 5.0 MGD and enhance its treatment to meet the permit discharge limitation. At the same growth rate, AWWTP will reach 80% of its capacity around the year 2035 and will reach 100% of its capacity around the year 2050. If the City expanded its treatment capacity to 5.0 MGD, City will be able to serve its projected growth of 20,000 EDUs.

At 2% historical growth rate, City of Aberdeen will reach its projected growth of 21,973 EDU's (including 1973 EDUs in Bush Chapel that will be served by the County Water and Sewer) around the year 2065.

Wastewater is the limiting factor for growth for the City of Aberdeen due to the nutrient loads being assessed on the City's AWWTP. Utilizing the limit of technology for wastewater treatment and nutrient load limitations, 5.00 MGD of treatment capacity at the AWWTP would be the maximum capacity allowed. Although from the above analysis it appears that water is the limiting factor for growth, but the City could obtain water from other sources such as additional purchased water from the County or, possibly cost prohibited, their own surface water/desalination treatment plant

HARFORD COUNTY WATER AND SEWER PLAN

Harford County updated its Water and Sewer Master Plan in April of 2010. Harford County updates its Water and Sewer Master Plan in Spring and Fall of each year. The current Water and Sewer Master Plan only indicates potential water and sewer service in the old growth area based on Harford County's 2004 Land Use Plan. The City of Aberdeen should work with Harford County in amending the Water and Sewer Master Plan upon review of the City of Aberdeen's designated growth areas and adoption of the plan by the City of Aberdeen to include the growth areas that are mapped as "No Planned Service" under the current Water and Sewer Master Plan; see Map 10-1: Water Service Areas and Map 10-2: Wastewater Service Areas, for growth areas mapped as "No Planned Service" areas.

STORMWATER LOADING

As part of the Water Resources Element, the Maryland Department of Environment has provided a spreadsheet to estimate the affect future development and land use changes will have on non-point source nutrient runoff, open space and impervious area. The City of Aberdeen is to create different land use scenarios and use the spreadsheet to calculate the impact of each land use scenario. The City of Aberdeen should select the least impactful land use scenario to guide future development.

The City of Aberdeen recognizes the importance of its natural resources and the need to preserve the Swan Creek, Bush River, Cranberry Run, and Aberdeen Proving Ground Watershed for future generations. Three land use scenarios were performed to determine non-point source loading. The City of Aberdeen will look to implement the vision of the City while providing recommendations to reduce the impact of future development.

This section also looks at Total Maximum Daily Loads (TMDLs) affecting City of Aberdeen and high quality Tier II waterways within Harford County. This section will also discuss potential solutions to reduce nutrient runoff.

Land Use Scenarios

Three land use scenarios were performed to determine non-point source loading. The first scenario looks at the affect planned development will have on increasing or decreasing non-point source runoff. The second scenario looks at the affect of the ultimate build out in the mapped growth areas and the third scenario looks at the affect of the proposed EDUs on the non-point source runoff. Each of these scenarios also looked at the runoff in three different watersheds that the City of Aberdeen is located in. There are no scenarios based on the different developments.

Non-Point Source Summary

Scenario 1 - Existing City Boundaries (Infill development)

Based on the non-point source (NPS) worksheet provided by the Maryland Department of the Environment, it is estimated that the City of Aberdeen is currently generating 34,469 pounds of nitrogen per year. Potential infill growth is estimated to decrease discharge levels to 33,855 pounds

of nitrogen per year generated by stormwater runoff; a decrease of 614 pounds per year. Phosphorous levels are currently being discharged at an estimated 3,615 pounds per year. Projected infill growth is estimated to increase phosphorous discharge to 3,648 pounds per year. City of Aberdeen also has 16 private septic systems that will be connected to the AWWTP in the future, further reducing the nitrogen discharge estimated at 154 pounds per year.

Please refer to Table 10-4 for the summary of initial and future nitogen and phosphorous discharge in each of watersheds. All estimates are based on projected future growth occurring inside the existing City limits. Any new development annexed into the City of Aberdeen will be required to address nutrient loading.

Scenario 2 – Future Growth Areas with Total Build-Out (34,554 EDU's)[5]

Based on the non-point source (NPS) worksheet provided by the Maryland Department of the Environment, it is estimated that nutrient runoff within the City of Aberdeen's growth areas is generating 100,285 pounds of nitrogen per year. Potential new growth is estimated to decrease discharge levels to 93,525 pounds per year generated by stormwater runoff; a decrease of 6,760 pounds per year. Phosphorous levels are currently being discharged at an estimated 9,224 pounds per year. Projected future growth is estimated to increase phosphorous discharge to 10,084 pounds per year; an increase of 860 pounds per year. All planning areas combined has approximately 798 residential septic systems and 170 acres of commercial septic system areas that are assumed to be connected to the AWWTP in the future, further reducing the nitrogen discharge estimated at 9,129 pounds per year.

Please refer to Table 10-4 for the summary of initial and future nitogen and phosphorous discharge in each of watersheds. All estimates are based on projected future growth occurring inside and outside the existing City limits. Any new development annexed into the City of Aberdeen will be required to address nutrient loading.

Scenario 3 –Future Growth Area with Proposed EDUs (10,743 EDU's)[6]

Based on the non-point source (NPS) worksheet provided by the Maryland Department of the Environment, it is estimated that nutrient runoff within the City of Aberdeen's growth areas is generating 100,285 pounds of nitrogen per year. Potential new growth is estimated to decrease discharge levels to 94,851 pounds per year generated by stormwater runoff; a decrease of 5,434 pounds per year. Phosphorous levels are currently being discharged at an estimated 9,224 pounds per year. Projected future growth is estimated to increase phosphorous discharge to 9,375 pounds per year; an increase of 151 pounds per year. All planning areas combined has approximately 798 residential septic systems and 170 acres of commercial septic system areas that are assumed to be connected to the AWWTP in the future, further reducing the nitrogen discharge estimated at 9,129 pounds per year.

[5] 34,554 EDUs includes 3,857 EDUs in the Bush Chapel planning area that will be served by the County Water and Sewer and 30,697 EDUs served by the City of Aberdeen's Water and Sewer.
[6] 10,743 EDUs includes 1,973 EDUs in the Bush Chapel planning area that will be served by the County Water and Sewer and 8,770 EDUs served by the City of Aberdeen's Water and Sewer.

Please refer to Table 10-4 for the summary of initial and future nitogen and phosphorous discharge in each of watersheds. All estimates are based on projected future growth occurring inside and outside the existing City limits. Any new development annexed into the City of Aberdeen will be required to address nutrient loading.

Table 10 -4: Summary of Estimated Non-Point Nitrogen and Phosphorous Discharge for Scenarios 1, 2, & 3

		Total Non-Point Discharge			Swan Creek		Bush River		APG Watershed	
		% Change	**Initial**	**Future**	Initial	Future	Initial	Future	Initial	Future
Nitrogen	Scenario 1	**-1.78**	**34,469**	**33,855**	18,661	19,467	9,837	9,674	5,971	4,715
	Scenario 2	**-14.52**	**109,413**	**93,525**	68,104	56,796	35,339	31,324	5,971	5,406
	Scenario 3	**-13.31**	**109,413**	**94,851**	68,104	59,707	35,339	29,738	5,971	5,406
Phosphorus	Scenario 1	**0.91**	**3,615**	**3,648**	1,955	2,071	1,059	1,062	601	515
	Scenario 2	**9.32**	**9,224**	**10,084**	5,439	6,136	3,184	3,347	601	601
	Scenario 3	**1.64**	**9,224**	**9,375**	5,439	5,632	3,184	3,141	601	601

Maryland Department of Environment (MDE) nitrogen, phosphorous loading and impervious surface estimates are based on land use assumptions. City of Aberdeen will work with MDE and Harford County to simplify and coordinate non-point source loading estimates and to coordinate improving the City of Aberdeen's stormwater loading reduction efforts. Due to the limitations of the Nonpoint Source Spreadsheet at the small-scale level, the results cannot be used to accurately predict actual nutrient loads within Swan Creek or other watersheds to allow for direct comparisons of TMDLs, but instead can only be used for comparing the relative impacts of alternative land use plans.

Open Space and Impervious Surfaces

Table 10-5 is a summary of changes in impervious surface and open space lands, both agricultural and forest, for the three scenarios. Scenario 3 is a midway of increase in development while keeping 63% of the agricultural open space and 78% of the forest open space.

Table: 10-5: Change in Impervious Surface and Open Space in Scenario 1, 2, & 3.

		Total		Swan Creek		Bush River		APG Watershed	
		Initial	**Future**	Initial	Future	Initial	Future	Initial	Future
Impervious Area	Scenario 1	**1,620**	**1,660**	842	880	553	555	225	225
	Scenario 2	**2,370**	**3,297**	1,168	1,897	977	1,152	225	247
	Scenario 3	**2,370**	**2,822**	1,168	1,500	977	1,075	225	247
Agricultural Open Space	Scenario 1	**228**	**124**	98	98	24	0	106	26
	Scenario 2	**2,630**	**904**	2,029	636	495	242	106	26
	Scenario 3	**2,630**	**1,687**	2,029	1,419	495	242	106	26
Forested Open Space	Scenario 1	**570**	**456**	570	456	0	0	0	0
	Scenario 2	**3,413**	**1,794**	2,174	739	1,239	1,055	0	0
	Scenario 3	**3,413**	**2,961**	2,174	1,788	1,239	1,173	0	0

City of Aberdeen determined that Scenario 3 with 10,743 EDUs (including 1,973 EDU's in the Bush Chapel planning area that will be served by the County Water and Sewer and 8,770 EDUs served by the City of Aberdeen's Water and Sewer) produced the best in overall loading calculations and minimizing future impervious surface area by protecting open spaces. Scenario 2 discharges less phosphorous compared to scenario 2 with a slight increase in nitrogen discharge.

TOTAL MAXIMUM DAILY LOAD (TMDLs) & WATERSHEDS

2008 Integrated Report of Surface Water Quality in Maryland required under sections 303 (d), 305 (b), and 314 and 202 (d) of the Federal Clean Water Act categorizes all the watersheds in the State of Maryland based on their water quality. Sections 305 (b) and 202 (d) of the Federal Clean Water Act require states, territories, and authorized tribes to perform annual water quality assessments to determine the status of jurisdictional waters. Waters that do not meet standards may require a TMDL to determine the maximum amount of an impairing substance or pollutant that a particular water body can assimilate and still meet water quality criteria.

A TMDL, as defined in Maryland 2008 Integrated Report of Surface Quality, is an estimate of the amount or load of a particular pollutant that a water body can assimilate and still meet water quality standards. After a total load has been developed, upstream discharges will be further regulated to ensure the prescribed loading amounts are attained.

The Maryland 2008 Integrated Report presents the current status of water quality in Maryland by placing all waters of the State into one of the five categories. A list of these categories and a brief explanation of the categories is as follows:

Category 1: water bodies that meet all water quality standards and no use in threatened;
Category 2: water bodies meeting some water quality standards but with insufficient data and information to determine if other water quality standards are being met;
Category 3: insufficient data and information are available to determine if any water quality standard is being attained. This can be related to having an insufficient quantity of data and/or an insufficient quality of data to properly evaluate a water body's attainment status.
Category 4: one or more water quality standards are impaired or threatened but a TMDL is not required or has already been established. Following subcategories are included in category 4:
Subcategory 4a: TMDL already approved or established by EPA;
Subcategory 4b: Other pollution control requirements are expected to attain water quality standards and,
Subcategory 4c: Water body impairment is not caused by a pollutant. (i.e. permits, consent decrees, etc.)
Category 5: Historic list of impaired water bodies known as 303(d) List, does not attain the water quality standard, and a TMDL or other acceptable pollution abatement initiative is required.

City of Aberdeen and its growth areas are located in three different watersheds: Swan Creek, Bush River, & Aberdeen Proving Ground (APG). Two of the three watersheds, Swan Creek & Bush River, are listed as Category 3 and APG is listed as Category 5.

Swan Creek: This watershed is listed as Category 3 under the 2008 Integrated Report and identifies the potential pollutants as Nutrients (nitrogen, phosphorus), Suspended Solids, and Combined Benthic/Fishes Bioassessments. The City of Aberdeen's wastewater treatment plant with a design capacity of 4 MGD and Swan Harbor Dell wastewater treatment plant, serving a mobile home park with a capacity of 5,000 GPD, are two point sources discharging into Swan Creek.

However, there is also a TMDL for Nitrogen and Phosphorus loading into Swan Creek approved by Watershed Protection Division of U.S. Environmental Protection Agency Region III in March of 2002. See Table 10-6 for TMDL's for Swan Creek. According to the report, State's 1996 list of Water Quality Limited Segments, Swan Creek is impaired by excess nutrients and suspended sediments. This report only addressed TMDL's for nitrogen and phosphorus and does not address sediment impairments. TMDL's for the nutrients are as follows:

TABLE 10-6: TMDL's for Annual Average Flow Conditions

	Nitrogen	**Phosphorus**
Non Point Source TMDL	121,907 lbs/year	9,774 lbs/year
Point Source TMDL	124,092 lbs/year	8,724 lbs/year
Total TMDL	**252,094 lbs/year**	**18,987 lbs/year**

Estimated non point Nitrogen and Phosphorous discharge for the City of Aberdeen three (3) scenarios is less than the non point source TMDL of the Swan Creek (refer to Table 10-4).

Following are the major waste water treatment plants (WWTP) within the Swan Creek watershed along with their current nutrient discharge loads and ENR load caps for planning purposes.

TABLE 10-7: Swan Creek WWTPs Nutrient Discharge Loads

WWTPs	Current*		ENR Load Cap	
	Nitrogen	Phosphorus	Nitrogen	Phosphorus
Aberdeen	25,651 lbs/year	1,238 lbs/year	48,729 lbs/year	3,655 lbs/year
Havre De Grace	20,586 lbs/year	2,158 lbs/year	11,573 lbs/year	868 lbs/year

Source: Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed – April 2008

* Current information is from the Year 2006 as presented in the source document

Bush River: This watershed is also listed as Category 3 under Integrated Report and identifies the potential pollutants as Nutrients (nitrogen, phosphorus), Estuarine Bioassessments, PCB in Fish Tissues, Suspended Solids, and Combined Benthic/Fishes Bioassessments.

Following are the major waste water treatment plants (WWTP) within the Bush River watershed along with their current nutrient discharge loads and ENR load caps for planning purposes.

TABLE 10-8: Bush River WWTPs Nutrient Discharge Loads

WWTPs	Current*		ENR Load Cap	
	Nitrogen	Phosphorus	Nitrogen	Phosphorus
Aberdeen Proving Ground – Edgewood	19,018 lbs/year	3,452 lbs/year	36,547 lbs/year	2,741 lbs/year
Sod Run	360,875 lbs/year	33,583 lbs/year	243,645 lbs/year	18,273 lbs/year

Source: Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed – April 2008

* Current information is from the Year 2006 as presented in the source document

Aberdeen Proving Ground: This watershed is listed as Category 5 under Integrated Report and identifies the potential pollutants as Nutrients (nitrogen, phosphorus), Estuarine Bioassessments, Toxics, Suspended Solids, and Combined Benthic/Fishes Bioassessments.

Following is the major waste water treatment plant (WWTP) within Aberdeen Proving Ground watershed along with its current nutrient discharge loads and ENR load cap for planning purposes.

TABLE 10-9: Aberdeen Proving Ground WWTPs Nutrient Discharge Loads

WWTPs	Current*		ENR Load Cap	
	Nitrogen	Phosphorus	Nitrogen	Phosphorus
Aberdeen Proving Ground – Aberdeen	16,326 lbs/year	379 lbs/year	34,110 lbs/year	2,558 lbs/year

Source: Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed – April 2008

* Current information is from the Year 2006 as presented in the source document

The City of Aberdeen should work to implement stormwater best management practices along all three watersheds to help reduce the pollutants through non-point source discharge. The City of Aberdeen should also monitor approval of the TMDL and implementation strategy for Bush River and Aberdeen Proving Ground. In addition, the City of Aberdeen should monitor progress of future TMDLs for the Swan Creek Watershed for other impairments discussed above.

TIER II WATERWAYS

Tier II waterways are considered to be waterways high in quality that require special protections. In Harford County, 7 waterways have been given Tier II status: Deer Creek 1, Deer Creek 4, Deer Creek 2, Little Gunpowder Falls 8, Little Gunpowder Falls 9, Overshot Branch 8, and Overshot Branch 7. The City of Aberdeen is not within a subwatershed affecting these Tier II designated creeks. See Appendix - Map 10-3: Tier II Waterways for the location of the waterways that require special protection. In the future, the City of Aberdeen should monitor future designations of Tier II waterways to ensure waterways affected by urban runoff or future development in the City are recognized and measures to maintain high quality waterways are implemented.

STORMWATER MANAGEMENT ACT OF 2007

The City of Aberdeen adopted new Stormwater Management regulations on May 10, 2010 by Ordinance # 10-O-08 to be consistent with The Maryland Stormwater Management Act of 2007.

POLICIES AND RECOMMENDATIONS

Potable Water

- Future growth will cause the water usage levels to exceed permitted thresholds. The City of Aberdeen should monitor water usage and request an increase to the permitted thresholds when necessary to meet future needs;
- Should an increase in permitted thresholds not be obtainable, alternate sources of water should be investigated such as surface water and/or purchase of additional water from Harford County;
- The City of Aberdeen should create an education and outreach program to provide residents and businesses with information concerning water conservation techniques in order to decrease water usage;
- Water meters should be periodically inspected to ensure proper water usage is being documented;
- The City of Aberdeen should continue to utilize and update their comprehensive water model to identify any pressure and/or flow deficiencies as well as identify any water main upgrades needed for future demands;
- The City of Aberdeen should pursue all funding opportunities available to improve the infrastructure in the Swan Meadows Development;
- The City of Aberdeen should implement the recommendations and the phasing plan proposed by the Arro Consulting, Inc. for the Swan Meadows Development to improve the infrastructure and avoid any future breaks in the water system;
- Any further annexation or expansion of water service in the HEAT area, particularly west side of Gilbert Road, must be provided with new water distribution system;
- The City of Aberdeen should monitor well production and prepare a well maintenance program to ensure wells operate efficiently;
- The City of Aberdeen should consider placing generators at all well sites to ensure adequate water production for fire protection during power outages;
- Increase in well production in the future will result in the need of additional water treatment capacity in order to maintain the water quality.
- City should consider and explore the idea of surface water with their own surface water/desalination water treatment plant to supplement needed water for growth;
- An engineering study should be completed to further analyzing existing and future demands along with determination of feasible options in regards to water sources (purchased water, surface water/desalinization plant) and treatment.

Wastewater Treatment

- Proceed with planned wastewater treatment plant upgrades to decrease nutrient loading;
- The City of Aberdeen should follow up with the repairs to problem areas identified under the I&I study to reduces the quantity of inflow and infiltration to the wastewater treatment facility;
- The City of Aberdeen should implement the recommendations and the phasing plan proposed by the Arro Consulting, Inc. for the Swan Meadows Development to improve the infrastructure and avoid infiltration and inflow problems in the sewer system;
- The City Aberdeen should closely monitor the public sewer service capacity needs to ensure that the system capacity is sufficient. When the capacity reaches 80%, the City of Aberdeen should begin the planning and design process to increase wastewater treatment plant capacity and increase the treatment to reduce the nutrient discharge for additional capacity or investigate additional discharge methods such as spray irrigation and point source trading such as discharge credits and trading consistent with MDE's Wastewater Capacity Management Plan Guidance;

- Explore the opportunity to obtain properties in the event that spray irrigation of the wastewater effluent is necessary to meet TMDL requirements;
- Work with Harford County to revise the County Water and Sewer Master Plan to include all the City of Aberdeen's growth areas;
- Reevaluate and upgrade the wastewater treatment plant to meet the desired effluent requirements as a result of the additional growth and/or more strict effluent limits.
- An engineering study should be completed to further analyzing existing and future flows along with determination of feasible options in regards to treatment and disposal alternatives.

Stormwater

- The City of Aberdeen should implement the recommendations and the phasing plan proposed by the Arro Consulting, Inc. for the Swan Meadows Development to improve the stormwater system to avoid flooding during the high storm events system.
- Examine the approved sediment impairments TMDL and implementation strategy for Swan Creek when available,
- Implement stormwater best management practices (BMPs) to reduce non-point source runoff and limit impairment to all three watersheds (Swan Creek, Bush River, Aberdeen Proving Ground);
- The City of Aberdeen should work with MDE and Harford County to simplify and coordinate non-point source loading estimates and to coordinate improving the City's stormwater loading reduction efforts;
- Monitor Tier II waterway future designations of the waterways to ensure waterways affected by urban runoff or future development in the City of Aberdeen are recognized and measures to maintain high quality waterways are implemented;

REFERENCES FOR WATER RESOURCE ELEMENT:

- 2009 Annual Drinking Water Report (Online at: http://www.mde.state.md.us/assets/document/watersupply/2009ccr/Harford/0120001%20City%20Of%20Aberdeen.pdf)
- National Pollutant Discharge Elimination System Permit for City of Aberdeen Advanced Wastewater Treatment Plant Permit (Permit # MD0021563)
- April 2010 Harford County Water and Sewer Master Plan
- Harford County Comprehensive Plan 2004
- Ten State Standards 2007 Edition (Online at: http://10statesstandards.com/waterstandards.html)
- State Water Appropriation Permit # HA1977G022 (06)
- Chapter 524 - Well Head Protection Ordinance – Adopted August of 2004
- 2004 Tributary Strategy for the Chesapeake Bay Watershed
- Water Service Purchase Contact between Harford County and City of Aberdeen – 1 through 6th amendments.
- 2000 Chesapeake Bay Agreement (Online at: http://www.chesapeakebay.net/content/publications/cbp_12081.pdf)
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